Of what use is all this? Could Faraday foresee that Morse would invent the telegraph or Bell the telephone? Could Helmholtz or König foresee the phonograph? Fortunately we live at a time when any addition to the world's knowledge of nature's truths is sufficient justification for any investigation however laborious.

The bolometer has already taught us that the firefly is a dozen times more economical as a light producer than our best electric

Fig. 5. A bolograph of the sodium double yellow line indicating the nickel line between them. This will show the extreme delicacy of this method of feeling and recording absorption lines.

lights and a hundred times better than our gas. It has taught us that our atmosphere acts like a valve, transmitting in almost undiminished strength the short quick waves of energy radiated to us from the sun, but refusing absolutely to return the long slow waves in which the earth tries to radiate the energy back into space. Without this atmosphere we should all have been frozen long ago.

We now know of electric waves which behave in every respect similarly to those of light, but which are many times longer and slower. Almost every month brings the announcement of shorter and faster electric waves, while Prof. Langley and his fellow laborers are continually detecting longer and slower light waves. Thus the boundaries of our knowledge are forced forward, and the unexplored strip becomes ever narrower. Light is as it were the snowy cap of a mountain. One explorer pushes downward from the light top into the dark regions lying below, while another from the broad and fertile valley of electricity struggles upward into the unknown. Are the two upon the same mountain? Will they ever meet? We hope so, we believe so, but until they have clasped hands we are not satisfied. Other workers may be found to be upon the same ether mountain, gravitation and other mysteries may there find a solution. What is above our mountain, unencumbered ether? thought? life?

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VERTEBRATE PALEONTOLOGY IN THE AMERICAN MUSEUM.

The American Museum of Natural History has recently acquired the collection of fossil mammals, made by Professor Cope between 1872 and 1895. The collection represents eleven geological horizons, including specimens from the Jurassic, Laramie (Cretaceous), Puerco, Wasatch, Wind River, Bridger, Washakie, White River, John Day, Loup Fork and Pleistocene. The collections from the John Day and Wasatch of New Mexico and Wyoming are exceptionally perfect, and that from the Puerco, together with the collection already in the Museum procured by the expedition of 1892, is unique. Four hundred and seventy species are represented, of which four hundred and two are types. The collection is representative of all of Professor Cope's researches upon the mammalia, with the exception of the greater portion of his work upon the Wheeler Survey, the types of which are contained in the Smithsonian Institution of Washington, and more recently of his work upon the Canadian and Texas Surveys. The most complete speci-

mens are the skeletons of *Hyracotherium* and *Phenacodus* from the Wasatch and of *Hyrachyus* from the Bridger. There are also skeletons of Galecynus and Trispondylus, and material for the restoration of several other animals. Professor Cope has reserved the right of describing the new material, but the entire collection will be arranged and placed on exhibition as rapidly as possible, and will be permanently known as the Cope Collection. A large new storeroom on the upper floor of the new wing of the Museum has been set apart especially for it. All the specimens will be numbered; the types designated under the direction of Professor Cope, and all information regarding localities, dates, description, etc., will be entered on a special card catalogue. The collection will thus be made readily accessible to students.

The Exhibition Hall on the third floor of the new wing of the American Museum has been designed and cased for the entire collection of fossil mammals, and will be opened for exhibition in November. The line of large cases on either side of the centre of the hall is designed for complete mounts of *Aceratherium*, *Metamynodon*, *Palæosyops* and *Titanotherium* and other animals now in preparation. The smaller side cases will contain morphological exhibits of the evolution of members of the families; also cases arranged geologically to represent the faunæ of each horizon; and a series of upright A cases designed for the exhibits of the evolution of the teeth, feet, skull and other special parts of the skeleton.

The expedition of 1895, the fourth which has been sent out, entered the Uinta beds early in the spring and explored the three levels in which the Uinta deposits are divided, as late as the water supply admitted. The party was then reinforced by a photographer, and, under the direction of Dr. Wortman, moved north to the southern exposure of the Washakie basin, east of the Green River, and is now working in the *Uintatherium cornutum* beds with considerable success. The work of these expeditions is not confined to the collections of fossil mammals, but to the careful survey of the successive depositions in these various basins. Every basin visited is explored with the greatest care to determine the vertical succession and horizontal distribution of species. The main result of this exploration is to prove that each of the larger subdivisions of Leidy, Cope and Marsh is capable of being divided into a number of successive stratifications or beds, distinguished by characteristic species. The application of this method was begun by the Princeton expedition of 1880 in the surveys of Professor McMaster, but unfortunately was not followed up with sufficient care. Several years ago Mr. J. B. Hatcher showed that the lower portion of the White River beds was capable of subdivision into three clearly defined levels, and the American Museum party of 1893–94 proved that above the Titanotherium beds five other specific levels could be determined, thus dividing the White River beds into eight levels. In 1894 the Uinta beds were proved to be distinctly divided into three levels, the older of which overlaps the somewhat older Washakie beds, and the uppermost overlaps the beds of the more recent White River beds, thus demonstrating that the Uinta is the complete link between the Middle Eocene and the Lower Miocene or Oligocene. This summer the party is endeavoring to determine the exact relations of the Washakie depositions to the somewhat older Bridger deposition west of the Green River.

HENRY F. OSBORN.

THE GEOGRAPHICAL DISTRIBUTION OF THE MOLLUSCA.

WE hear a great deal of late concerning the habits, range of variation, and special characteristics of a great number of forms